AIDC and OLDI: gap analysis

AIDC SEMINAR

Cairo, 03 March 2014

This analysis on 9 items

1. Both standards cover notification, coordination and transfer phases around FIR boundaries, defining messages exchanged between an upstream and a downstream Flight Data Processor : Inter-centre communications or ICC in Annex 10 vol II
2. Both standards (AIDC: 20 messages, OLDI: 37 messages) share a little common basis (>6 out of 57 messages), plus messages being different having yet the same intention.
3. OLDI has more specific messages (31 out of 57) than AIDC (14 out of 57), due to radar operations, a more refined negotiation process, civil-military coordination, and metering between ATSU
4. OLDI widely used in Europe, and is a means of compliance for the COTR (COordination- TRansfer) regulation
5. AIDC widely used elsewhere, with ICAO urging implementation for non implemented ATSUs

This analysis on 9 items

6. Industry has been providing with ATM systems for a long time often with both standards, but different HMI design;
7. Implementation by ANSPs with possibilities of using both standards or choosing one of them based on the requirement of the counterpart
8. Experience gained/lessons learnt demonstrated that operations benefit from a minimal message set, reducing the likelihood of LHD occurrences and alleviating ATCO workload, and that other benefits should be sought through coordination with corresponding ATSU
9. Between ICAO regions: a PAN AIDC standard is being developed resulting from existing NAT and APAC AIDC ICDs, whilst implementation between ATSUs using either OLDI or AIDC standards would require guidance or sharing experience of good practice.

Agenda

- Gap analysis result
- Definition & operational scope
- OLDI/AIDC messages comparison
- Implementation
- Regulatory considerations

Gap analysis

- A gap analysis between AIDC and OLDI is performed throughout the presentation:
  - Red color is used in association with OLDI
  - Grey color is used in association with AIDC
  - Black color is used for the common messages/functionalities

Definitions, operational scope

- AIDC- ATS Interfacility Data Communication
  - Specified in Manual of Air Traffic Services Data Link Applications ICAO Doc 9694, part VI
  - Doc4444

- Specification of peer to peer messages including the rules for processing, content, format
  - 2 message formats: ICAO Doc 4444 and ADEXP
  - Standardized by Eurocontrol

Definitions, operational scope

- Covers
  - Notification of flights approaching a flight information region (FIR) boundary
  - Coordination of boundary-crossing conditions (including reroute)
  - Transfer of control
  - Transfer of communications
  - CIVIL/CIVIL coordination
  - Transfer of information contained in an ADS-C report from one ATSU to another
- Local propagation of events (between adjacent FDPs)

- Covers
  - Notification of flights approaching a flight information region (FIR) boundary
  - Coordination of boundary-crossing conditions (including reroute)
  - Transfer of control
  - Transfer of communications
  - Arrival management
  - SSR code assignment
  - Particularize an aircraft between ATSU
  - Skip communications
  - CIVIL/CIVIL and CIVIL/MIL coordination
- Local propagation of events (between adjacent FDPs)

OLDI/AIDC messages comparison

Messages comparison

- A gap analysis between AIDC and OLDI messages follows
  - Common basis
  - Notification, Coordination, Transfer
  - Air/ground datalink
  - Flight planning
  - Civil/military coordination
  - Situation awareness
  - Other messages

Common basis

Phase		Message	Message Intent	Gap analysis
Notification	Notify	ABI	Advance Boundary Information	Common
Coordination	CoordinateInitial	PAC	Preliminary Activation	Common
Coordination	CoordinateNegotiate	CDN	Co-ordination	Common
Coordination	CoordinateAccept	ACP	Acceptance	Common
Coordination	CoordinateCancel	MAC	Message for Abrogation of Co-ordination/ Coordination Cancellation	Common
Transfer	AppAccept	LAM	Logical Acknowledgement	Common

- 6 messages in common (ACT/EST, REV/CDN, TIM/CDN, ACP is not common but EMG)

Notification, coordination, transfer (1/2) - **Core set**

Phase		Message	Message Intent	Gap analysis
Notification	Notify	ABI	Advance Boundary Information	Common
Coordination	CoordinateInitial	CPL	Current Flight Plan	AIDC
Coordination	CoordinateInitial	EST	Coordination Estimate	AIDC
Coordination	CoordinateInitial	PAC	Preliminary Activation	Common
Coordination	CoordinateInitial	ACT	Activate message	OLDI 3.0
Coordination	CoordinateInitial	REV	Revision	OLDI 3.0
Coordination	CoordinateNegotiate	CDN	Co-ordination	Common
Coordination	CoordinateAccept	ACP	Acceptance	Common
Coordination	CoordinateReject	REJ	Rejection	AIDC
Coordination	CoordinateCancel	MAC	Message for Abrogation of Co-ordination/ Coordination Cancellation	Common
Transfer	TransferControl	TOC	Transfer of Control	AIDC
Transfer	TransferControlAssume	AOC	Assumption of Control	AIDC
Transfer	AppAccept	LAM	Logical Acknowledgement	Common
Transfer	AppError	LRM	Logical Rejection	AIDC
General information	FreetextEmergency	EMG	Emergency	AIDC
General information	FreetextGeneral	MIS	Miscellaneous	AIDC

- **CORE SET of messages for** Notification, coordination and transfer –Initial Purpose of AIDC and OLDI
  - **Essential** subset of messages: its implementation brings immediate benefits for safety (reduced frequency of erroneous transfers, of Large Height Deviations, etc.) and ATCO workload reduction (phone coordinations replaced by automatic message exchanges)
  - Referred to as the “core” (APAC AIDC v3) or “basic procedure” message set (OLDI v4.2) (NAT region has defined an even greater core subset)
  - Its use may be largely integrated through the label in the air situation display (radar areas)
  - In non radar areas, often presented in a dedicated window
  - Suits simple scenarios of negotiation, else revert to/use voice communications
- Gap analysis: **functional equivalence** between AIDC and OLDI on the essential set

Notification, coordination, transfer (2/2) – **Non essential set**

Phase		Message	Message Intent	Gap analysis
Pre-departure coordination		CRQ	CLEARANCE REQUEST	OLDI 3.0
Pre-departure coordination		CRP	CLEARANCE RESPONSE	OLDI 3.0
Coordination	CoordinateInitial	RAP	Referred Activate	OLDI 3.0
Coordination	CoordinateInitial	RRV	REFERRED REVISION PROPOSAL	OLDI 3.0
Coordination	CoordinateReject	RJC	Reject	OLDI 3.0
Coordination		RRQ	RELEASE REQUEST	OLDI 3.0
Coordination		RLS	RELEASE MESSAGE	OLDI 3.0
Coordination		RTI	REQUEST TACTICAL INSTRUCTIONS	OLDI 3.0
Coordination		TIP	TACTICAL INSTRUCTIONS PROPOSAL	OLDI 4.2
Coordination		TRU	Track Update	AIDC
Coordination	CoordinateStandby	SBY	Stand-by	OLDI 3.0
Coordination	Co-ordination between Oceanic and Area centres	ROC	REQUEST OCEANIC CLEARANCE	OLDI 4.2
Coordination	Co-ordination between Oceanic and Area centres	OCM	OCEANIC CLEARANCE	OLDI 4.2
Transfer	TransferInitiate	TIM	Transfer initiation	OLDI 3.0
Transfer	TransferConditionsProposal	HOP	Hand-over proposal	OLDI 3.0
Transfer	TransferRequest	ROF	Request on frequency	OLDI 3.0
Transfer	TransferComm	COF	Change of Frequency	OLDI 3.0
Transfer	TransferCommAssume	MAS	MANUAL ASSUMPTION OF COMMUNICATIONS	OLDI 3.0
Transfer	TransferControl	SDM	SUPPLEMENTARY DATA MESSAGE	OLDI 3.0
Transfer	AppStatus	ASM	Application Status Monitor	AIDC

- **Non essential** subset of messages for coordination and transfer
  - OLDI ROC and OCM are implemented between oceanic and continental centres
  - Other coordination OLDI messages are refining the negotiation process: rarely implemented
  - OLDI Transfer of Communications messages (COF, ROF) allow **radar hand-offs** and bring immediate benefits on safety and workload reduction
- Gap analysis: OLDI standard is better equipped for radar hand-offs (largely used in Europe) and refined coordination negotiations

Air/ground datalink

Phase		Message	Message Intent	Gap analysis	Comment
AIR / GROUND DATA-LINK		LOF	Logon forward message	OLDI 4.2	transmitted to provide the ATN or FANS/1A logon parameters to the receiving data-link equipped unit, to allow the unit to use the data link applications (CM, CPDLC, ADS, FIS)
AIR / GROUND DATA-LINK		NAN	Next authority notified	OLDI 4.2	Notify the receiving air/ground data link equipped ATC unit that it can initiate a Controller Pilot Data Link Communication (CPDLC) Start Request with the aircraft because the aircraft is authorised to accept a CPDLC connection request from the receiving air/ground data link equipped ATC unit
AIR / GROUND DATA-LINK		FAN	FANS Application Message	AIDC	transmitted by one ATSU (generally the controlling ATSU) to another ATSU (generally the receiving ATSU) to provide the required information necessary to establish CPDLC and/or ADS-C connections with a FANS equipped aircraft
AIR / GROUND DATA-LINK		FCN	FANS Completion Notification	AIDC	transmitted by the transferring ATSU when their CPDLC Connection with the aircraft is terminated, providing notification to the receiving ATSU that they are the CPDLC Current Data Authority. It may also be transmitted by the receiving ATSU to provide notification of the establishment of a CPDLC Connection or the failure of a CPDLC Connection request
AIR / GROUND DATA-LINK		ADS		AIDC	Used to transfer information contained in an ADS-C report from one ATSU to another

- Subset of message used for FDP cooperation to establish and release datalink connections when transferring datalink capable aircraft at a coordination point
- Gap analysis: **relative functional equivalence** but significant differences yet:
  - OLDI messages enable to handle accommodation (ATN and FANS 1/A aircraft) whilst AIDC does not convey the full ATN logon context
  - AIDC is better equipped to share FANS 1/A ADS-C surveillance reports with another ATSU (e.g. in Areas of Common Interest)

Flight planning

Phase		Message	Message Intent	Gap analysis	Comment
Flight planning		TDM	Track Definition Message	AIDC	Used to distribute track information to affected Area Control Centres (ACCs) and Airline Operational Control Centres (AOCs) for flight planning

- AIDC TDM message used to disseminate track information
- Latitude/longitude Waypoints or named en route points, allows User Preferred Routes
- No equivalent in OLDI as an Initial FPL Processing System (IFPS) operated by Eurocontrol distributes initial flight plans as part of the Network function in Europe
- Gap analysis: **no functional equivalence** for flight planning due to different operational concepts

Civil-military tactical coordination

Phase		Message	Message Intent	Gap analysis	Comment
Civil Military Coordination		XIN	CROSSING INTENTION NOTIFICATION	OLDI 4.2	
Civil Military Coordination		XRQ	CROSSING CLEARANCE REQUEST	OLDI 4.2	
Civil Military Coordination		XAP	CROSSING ALTERNATE PROPOSAL	OLDI 4.2	
Civil Military Coordination		XCM	CROSSING CANCELLATION	OLDI 4.2	
Civil Military Coordination		SBY	STAND-BY	OLDI 4.2	
Civil Military Coordination		ACP	ACCEPTANCE	OLDI 4.2	
Civil Military Coordination		RJC	REJECT CO-ORDINATION	OLDI 4.2	

- OLDI includes a subset of messages for dialogue between civil and military units, not implemented in Europe to date
- Different operational concepts of coordination/integration between civil and military operations exist in the world
- This OLDI message subset assumes that these units
  - operate distinct airspaces with crossing flights needing coordination
  - operate different ground systems
- Civil-military flight data exchange and airspace crossing
- Gap analysis: no AIDC messages for civil-military tactical coordination

Situation awareness

Phase		Message	Message Intent	Gap analysis	Comment
Situational awareness		BFD	Basic flight data	OLDI 4.2	
Situational awareness		CFD	Change to flight data	OLDI 4.2	
Situational awareness	GeneralPoint	INF	INFORMATION	OLDI 4.2	used to provide information on specific flights to agencies not directly involved in the co-ordination process

- OLDI includes a subset of messages for directing flight coordination information towards third party organizations like the provision of Flight information to military
- Gap analysis: no AIDC messages standardized for flight coordination information towards third party organizations

Other messages

Phase		Message	Message Intent	Gap analysis	Comment
Basic procedure - complementary messages		COD	SSR CODE ASSIGNMENT	OLDI 4.2	issue of a Mode A SSR code by one ATSU to another, inform the transferring ATSU of the next Mode A SSR code when the code assigned cannot be retained by the accepting Air Traffic Service Unit
Basic procedure - complementary messages		SCO	SKIP COMMUNICATION	OLDI 4.2	sent by the accepting unit to indicate that communication with the flight is to pass directly to a sector other than the accepting sector
Basic procedure - complementary messages		SKC	SKIP CANCELLATION	OLDI 4.2	
Basic procedure - complementary messages		PNT	POINT	OLDI 4.2	
Basic procedure - complementary messages		AMA	ARRIVAL MANAGEMENT MESSAGE	OLDI 4.2	Provides the transferring unit with TTL/TTG, target time for the flight to be at the COP, speed advisory for arrival management

- OLDI specific message (COD) for SSR code assignment to dynamically use scarce mode A codes
- OLDI specific messages (SCO/SKIP) for skipping the accepting sector in the TOC process
- OLDI specific message (PNT) to particularize a flight between ATSUs (to ease coordination dialogue between ATCOs)
- OLDI specific message (AMA) used for conveying the TTL/TTG budget and/or target time at the COP to maintain sequences between ATSUs
- Gap analysis: no functional equivalence in AIDC for SSR code assignment, skip of communications, Point session and sequencing

IMPLEMENTATION

Implementation (1/2)

AIDC

- Worldwide implemented, except Europe
  - Oceanic/remote areas
  - Dense/continental areas
- Different versions in use
  - NAT ICD 1.3 or previous
  - APAC ICD v3 or previous
- ANSP opt for subsets of messages in line with the operational needs and sign bilateral Letters of agreement accordingly
  - Basic co-ordination messages widely implemented (notification and initial co-ordination)
  - Some transfer messages implemented

OLDI

- Implemented in Europe
  - Dense/continental areas
  - Boundaries with oceanic airspaces
  - Between almost all European ACCs, and with North Africa
  - Radar surveillance
- Different versions in use
  - Versions 4.2, 2.3 or previous
- ANSP opt for subsets of messages in line with their operational needs and sign bilateral Letters of agreement accordingly
  - Basic co-ordination messages widely implemented (notification and initial co-ordination)
  - Some transfer messages implemented
  - Mandatory part by IR COTR

Implementation (2/2)

AIDC

- May be complemented locally with custom messages/fields (radar hand-offs, etc.)
- Operational benefits
  - Reduction in coordination failures and human errors
  - Reduction in telephone calls
  - Flight Data Operators can prioritize work
- Bilateral LOA address the subset of messages used and associated procedures
- Conveyed over AMHS/IP, AMHS/IP or AFTN

OLDI

- May be complemented locally with custom messages/fields (radar hand-offs, etc.)
- Operational benefits
  - Reduction in coordination failures and human errors
  - Better management of SSR codes by automatic allocation of SSR code from a centralized SSR pool
  - Reduction in telephone calls
  - Flight Data Operators can prioritize work
- Bilateral LOA address the subset of messages used and associated procedures
- Eurocontrol Test tool called ETIC for OLDI and the communication layer
- Conveyed over FMTP/IP and CIDIN/X25 (less and less)

REGULATORY CONSIDERATIONS

Regulation

AIDC

- No AIDC mandate
- ICAO encourages implementation, and proposes mandates where needed
- APAC: wide implementation still progressing, AIDC is a priority 1 in regional seamless ATM plan (ABI, EST, ACP, TOC and AOC)
- NAT has widely implemented (AIDC rollout 2010-2013)

OLDI

- Regulation No 552/2004: interoperability of the European Air Traffic Management network
- Message set: European Commission Implementing Rule No 1032/2006 (IR COTR) amended by EC 30/2009
- EUROCONTROL OLDI Specification Edition 4.2 as a means of compliance (Community Specification)
- Mandatory part
  - Notification
  - Initial co-ordination
  - Cancellation of co-ordination
  - Revision of co-ordination
  - Civil-military co-ordination
- Optional part
  - Pre-departure co-ordination
  - Transfer of communication
- Support to air-ground data link in process of being added as mandatory for ATSUs that are CPDLC equipped
- Different dates for current and new ATS systems
- Communications: Commission Implementing Rules 633/2007 and 2083/2011 FMTP
- X25 replaced by IP
- Adoption of FMTP (Flight Message Transfer Protocol)

References

- ICAO Annex 10, volume II
- ICAO Doc 4444 PANS ATM
- ICAO Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN) (Doc 9705), Sub-volume III
- ICAO Pan Regional (NAT and APAC) Interface Control Document for ATS Interfacility Data Communications (PAN ICD), Coordination Draft Version 0.8 — 26 July, 2013
- EUROCONTROL Specification for On-Line Data Interchange (OLDI) Edition 4.2, 16/12/2010
- EUROCONTROL Corrigendum to Edition 4.2, 16/12/2010
- ICAO Doc 9750, Global Air Navigation Plan, 4th Edition - 2013
- Eurocae ED-133 Flight Object interoperability specification, June 2009
- FIXM: www.FIXM.aero

ACRONYMS

- APAC: Asia-Pacific
- ATS: Air Traffic Services
- AIDC: ATS Interfacility Data Communication
- AIM: Aeronautical Information Management
- AIXM: Aeronautical Information eXchange Model
- ATCO: Air Traffic Controller
- EUR: Europe
- FIR: Flight information region
- FIXM: Flight Information eXchange Model
- FO: Flight Object
- GANP: Global Air Navigation Plan
- ICAO: International Civil Aviation Organisation
- ICC: Inter-centre communications
- ICD: Interface Control Document
- LHD: Large Height Deviation
- NAT: North Atlantic
- NextGen: Next Generation Air Transportation System
- SESAR: Single European Sky ATM Research
- SWIM: System Wide information Management
- WXXM: Weather eXchange Model


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